

Columbia River Salmon and Steelhead Endorsement Recreational Anglers Board
Application for Funding

Applicant: Joe Bumgarner (Snake River Lab) and Todd Seamons (WDFW Genetic Unit)

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Proposal Title: GENETIC ASSAY TO DETERMINE GENETIC RELATIONSHIP OF SMALL TRIBUTARIES BETWEEN THE TUCANNON RIVER AND ASOTIN CREEK TO MAINTAIN THE TUCANNON STEELHEAD FISHERY - **new**

Date of submission: December 15, 2015

Effective Period of Funding: March 1, 2016 -Nov 30, 2016

Amount of Funding Requested: \$33,200

Activity to be funded:

The Washington Department of Fish and Wildlife (WDFW) is requesting funding to perform genetic analysis to determine differences in steelhead populations in southeastern Washington. The samples would be run from adult steelhead tissue samples collected from small Snake River tributaries that lie between the Tucannon River and Asotin Creek (Table 2). The goal of this project is to determine genetic relationships among collections from natural origin steelhead from these small tributaries (currently assigned to either the Tucannon River or Asotin Creek based on geographic distance (ICTRT 2005)) using genetic markers selected for their ability to distinguish Tucannon River steelhead from Asotin Creek steelhead (Seamons et al 2015).

Determining the genetic relationship of these small tributaries to either the Tucannon River or Asotin Creek steelhead populations will help determine future steelhead fishery impacts in the Tucannon River.

Background:

The WDFW Fishery Management and Evaluation Plan (FMEP), and associated 4d permit from National Marine Fisheries Service (NMFS), which allows steelhead fisheries in the Snake Basin portion of southeast Washington, requires that the abundance of natural populations of Endangered Species Act (ESA) listed steelhead must exceed a critical threshold (average of 285 fish annually) in order for the incidental mortality from catch and release to be considered acceptable. If the critical abundance threshold is not achieved as a five year rolling average of natural origin steelhead abundance, WDFW is required to meet with NMFS to evaluate whether the fishery, or the hatchery program, should be allowed to continue, or whether the incidental

impacts would be unacceptable based on the low natural origin population estimate for the Tucannon River.

Currently, WDFW is utilizing passive integrated transponder (PIT) tag arrays in the Tucannon River and implanting PIT tags into natural and hatchery origin steelhead smolts from the Tucannon River. Through the use of these instream PIT tag arrays, WDFW has made estimates of the number of natural and hatchery endemic stock summer steelhead entering the Tucannon River. The most recent seven year average of natural origin Tucannon River steelhead, estimated by PIT tag arrays in the Tucannon River only, is about 260 fish. The most recent seven year average of hatchery origin Tucannon River stock steelhead in the Tucannon River is about 360 fish. WDFW also operates adult steelhead traps in other small Snake River tributaries on a rotational basis from which the genetic samples for the proposed analysis were obtained. Estimates of natural origin fish from those tributaries have not yet been added to the above totals or natural or hatchery origin steelhead in the Tucannon River provided here.

The Interior Columbia Basin Technical Review Team (ICTRT) convened by NMFS, and the Snake River Salmon Recovery Plan (SRSRB 2006 and 2011) included natural origin steelhead in several tributaries of the Snake River as part of the Tucannon or Asotin populations based on geographic location. Natural origin steelhead in Deadman Creek in Garfield County, on the south side of the Snake River, and Penawawa and Alkali Flat creeks in Whitman County, on the north side of the Snake River, were considered part of the Tucannon steelhead population. Almota Creek is also a Whitman County tributary of the Snake River, downstream of Lower Granite Dam. This stream was grouped with the Asotin population of steelhead because it is geographically closer to Asotin Creek than the Tucannon River. However, it is currently unknown if this inclusion with the Asotin population is more biologically appropriate than including steelhead in this stream with the Tucannon population. The uncertainty regarding the inclusion of natural origin steelhead in any of these small Snake River tributaries with the Tucannon population is a critical data gap that affects the estimates of natural origin abundance and achievement of the critical threshold for the Tucannon population.

Completion of the proposed work would allow for assigning steelhead from these small tributaries based on genetic similarity to either the Tucannon River or Asotin Creek. We will utilize our standard panel of 192 single nucleotide polymorphism (SNP) markers and the 199 SNP markers selected for their ability to distinguish steelhead from Tucannon River and Asotin Creek (Seamons et al 2015).

Without this genetic information regarding the appropriate association of these tributaries with the Tucannon population, the WDFW may be forced to further restrict or close the Tucannon River steelhead fishery. If we have genetic evidence that the natural origin steelhead in these tributaries appropriately should be grouped with the Tucannon steelhead population the total natural origin abundance of Tucannon steelhead will likely remain above the critical threshold and fisheries within the Tucannon River would be expected to continue.

WDFW has completed the transition from the past use of Lyons Ferry Hatchery (LFH) stock to the full use of the hatchery endemic stock in the Tucannon River, which includes a portion of the release that are now adipose fin clipped and available for the fishery. The first returns of adipose fin clipped Tucannon stock occurred in the fall of 2015. Continuation of the fishery during the

transition period enabled anglers to remove marked hatchery strays that are currently returning to the Tucannon River from other river basins (i.e. Lions Ferry, Walla Walla, Touchet, and upper Snake River hatchery stocks) to prevent them from spawning with ESA listed steelhead in the Tucannon River. Completion of the genetic comparisons of steelhead from these small tributaries to the Asotin and Tucannon populations will be the final step needed so we can properly manage and justify the steelhead fishery in the Tucannon River to NOAA Fisheries.

Proposed Activity and Assistance Required:

WDFW requests funding to pay for development of high-throughput genotyping panels for use in so-called genotyping-by-sequencing techniques (e.g., gtSeq (Campbell et al. 2015)) and for genotyping of tissue collections from small Snake River tributaries. Generally we will genotype a maximum of 50 individuals from each tributary for each year where we have samples currently (see Table 1 – for a list of all samples/year, see Table 2 for samples that will be run), though an exception will likely be made in Almota Creek for 2011. Sub-sampled fish will represent the population return for that year based on known ages from scale samples collected. Cost per sample is estimated at \$61.82/sample.

Table 1. Genetic samples collected from small tributaries between Asotin Creek and the Tucannon River, 2008-2015.

| Year | Alpowa | Almota | Deadman | Penewawa | Total |
|--------------|------------|------------|-----------|-----------|--------------|
| 2008 | 75 | --- | --- | --- | 75 |
| 2009 | 29 | --- | --- | --- | 29 |
| 2010 | 100 | --- | --- | --- | 100 |
| 2011 | 134 | 70 | --- | --- | 204 |
| 2012 | 160 | 50 | 10 | --- | 220 |
| 2013 | 98 | --- | 7 | 24 | 129 |
| 2014 | 131 | 8 | --- | 27 | 166 |
| 2015 | 157 | --- | --- | 48 | 205 |
| Total | 884 | 128 | 17 | 99 | 1,128 |

Table 2. Genetic samples that will be run per year from small tributaries between Asotin Creek and the Tucannon River, 2008-2015.

| Year | Alpowa | Almota | Deadman | Penewawa | Total |
|--------------|------------|------------|-----------|-----------|------------|
| 2008 | 50 | --- | --- | --- | 50 |
| 2009 | 29 | --- | --- | --- | 29 |
| 2010 | 50 | --- | --- | --- | 50 |
| 2011 | 50 | 70 | --- | --- | 120 |
| 2012 | 50 | 50 | 10 | --- | 110 |
| 2013 | 50 | --- | 7 | 24 | 81 |
| 2014 | 50 | 8 | --- | 27 | 85 |
| 2015 | 50 | --- | --- | 48 | 98 |
| Total | 379 | 128 | 17 | 99 | 623 |

Deliverables (to be compiled or summarized in a project report)

1. Provide statistical measures of genetic relationships and population assignment to the Tucannon River and/or Asotin Creek from these small Snake River tributaries using the statewide standard 192 SNP markers and the additional 199 markers selected for their ability to distinguish steelhead from the Tucannon River and Asotin Creek (Seamons et al. 2015).

Budget*

| Category | Cost (623 samples) |
|--|--------------------|
| Development of high-throughput panel (consumables, goods and services) | \$6,200 |
| Genotyping by sequencing (laboratory, consumables) | \$10,000 |
| Labor (bioinformatics, analysis, and write-up) | \$17,000 |
| Sub-total Direct | \$33,200 |
| TOTAL | \$33,200 |

* CRSSRAB Request for 2016 is shown, but some of the planning and reporting work is provided as cost share using other WDFW funding.

Need for Proposed Activity:

In order to determine whether the Tucannon steelhead population is meeting the critical abundance threshold, we must be able to provide better estimates of total adult abundance or escapement, and know which tributaries of the Snake River can be included in the total Tucannon natural origin abundance estimate. Unless we can show that the Tucannon natural origin steelhead population exceeds the critical threshold that is set in the FMEP (285 adults), the Tucannon River steelhead fishery is in jeopardy of further restrictions, regardless of how many adipose clipped hatchery fish may be available for harvest within the Tucannon River.

This genetic study is part of a larger effort WDFW is conducting to better understand the interrelationships and adult abundances of the Asotin and Tucannon steelhead populations within 1) the LSRCP Program, 2) BPA funded projects that monitor steelhead in Asotin Creek and these small Snake River tributaries, and 3) WDFW PIT tagging and smolt monitoring efforts for both hatchery and natural origin steelhead in the Tucannon River.

Benefit of Proposed Activity:

The proposed activity is critical for determining the potential contribution of small Snake River tributaries to the Tucannon population so the Tucannon Fishery may remain open and also for meeting ESA recovery goals.

The Tucannon steelhead fishery is important to many landowners along the Tucannon River, as well as to businesses in the area (e.g. bait and tackle shop, RV Park, etc.) and to many anglers from a wide geographic distribution (Pullman, Walla Walla, Clarkston, Dayton, Spokane, etc.) that have participated in this fishery, some for many years. This fishery is very socially, culturally and economically important to citizens in southeast Washington.

The economic value of the Tucannon River steelhead fisheries can be estimated based on the number of angler days expended per year (WDFW), which ranged from one to six thousand per year on the Tucannon River, with an average of approximately 3,000 angler days annually. By

applying the statewide standard of \$58 per angler day, the economic benefits of this fishery would range from \$58,000 - \$348,000 per year, with an average of ~\$174,000 per year. Those estimates could be increased to account for inflation to bring the estimates up to current dollar value. The NMFS uses \$86 per angler day in their biological assessment of the hatchery programs in the Columbia Basin, which would value the fishery at ~\$258,000.

Additional Considerations:

Maintenance of the Tucannon River steelhead fishery is very important to the angling public, local landowners, and members of the Snake River salmon recovery board to show that local recreational opportunities and economic benefits can be maintained while striving to achieve ESA recovery goals. The public can become frustrated and disinterested in the long-term recovery efforts unless they feel that local benefits can be maintained or enhanced. Some landowners and citizens have expressed much less interest in continuing efforts to enhance habitat or to allow fish and habitat monitoring on private lands if the fishery might not be allowed to continue. The potential closure of this fishery has become quite heated for some of the public within the past few years and it has created political and social turmoil.

Literature Cited

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